

# Vectors in R

$\mathbb{R}$  denotes the collection of all real numbers.

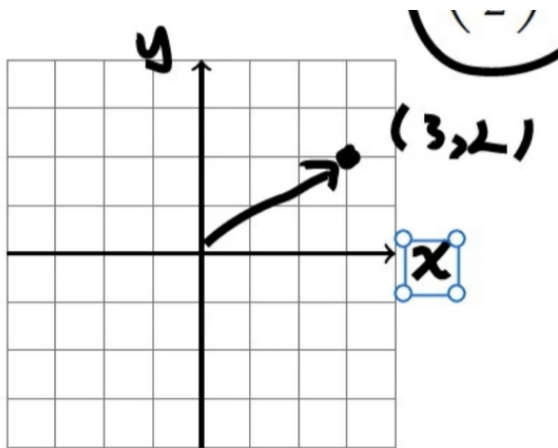
$\mathbb{R}^1 = \mathbb{R}$  is a number line

$\mathbb{R}^2$  is a plain

$\mathbb{R}^3$  is a 3-D space.

## Vectors

Point  $[3, 2]$  can be represented as the vector  $\begin{bmatrix} 3 \\ 2 \end{bmatrix}$



Vectors properties:

$$\vec{u} = \begin{pmatrix} u_1 \\ u_2 \end{pmatrix}, \quad \vec{v} = \begin{pmatrix} v_1 \\ v_2 \end{pmatrix}.$$

Vectors have the following properties.

1. **Scalar Multiples:**

$$c\vec{u} = \begin{pmatrix} cu_1 \\ cu_2 \end{pmatrix} = \begin{pmatrix} cu_1 \\ cu_2 \end{pmatrix}$$

2. **Vector Addition:**

$$\vec{u} + \vec{v} = \begin{pmatrix} u_1 \\ u_2 \end{pmatrix} + \begin{pmatrix} v_1 \\ v_2 \end{pmatrix} = \begin{pmatrix} u_1 + v_1 \\ u_2 + v_2 \end{pmatrix}$$